User Manual

Temperature Calibrator

JOFRA ATC-125/140/156/157/250/320/650 A/B

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Fig 1a

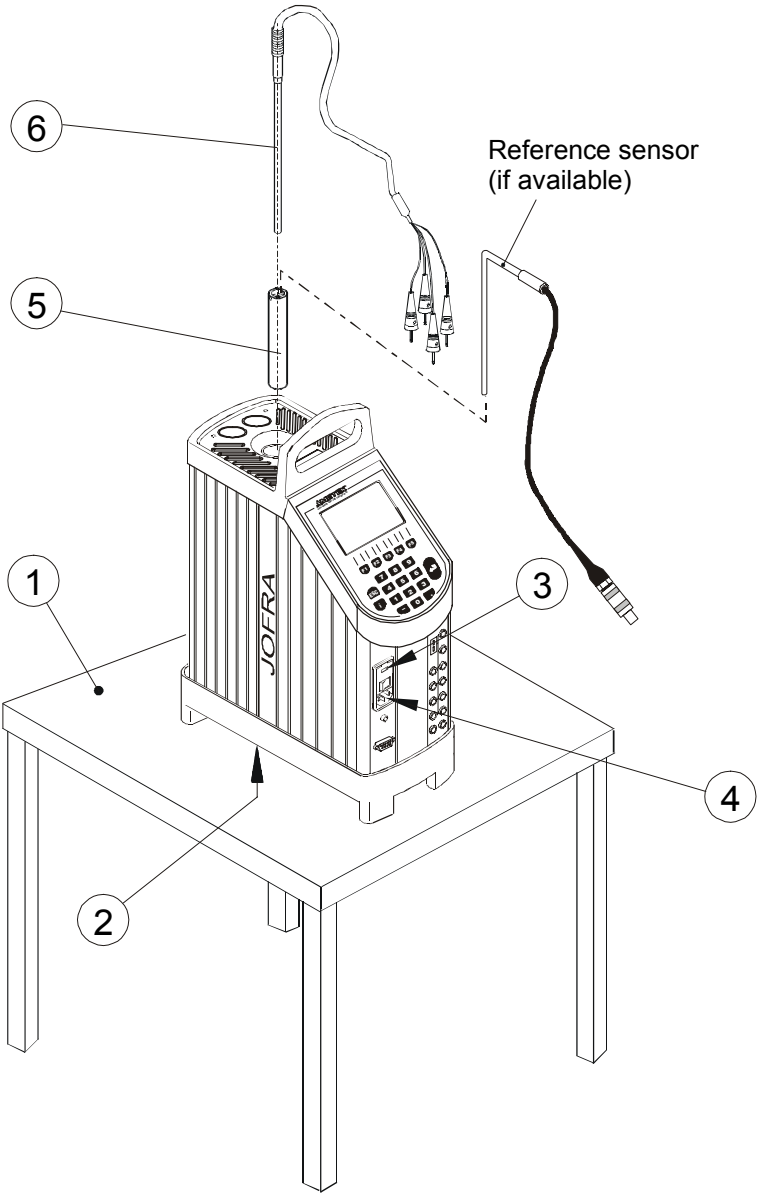


Fig 1b

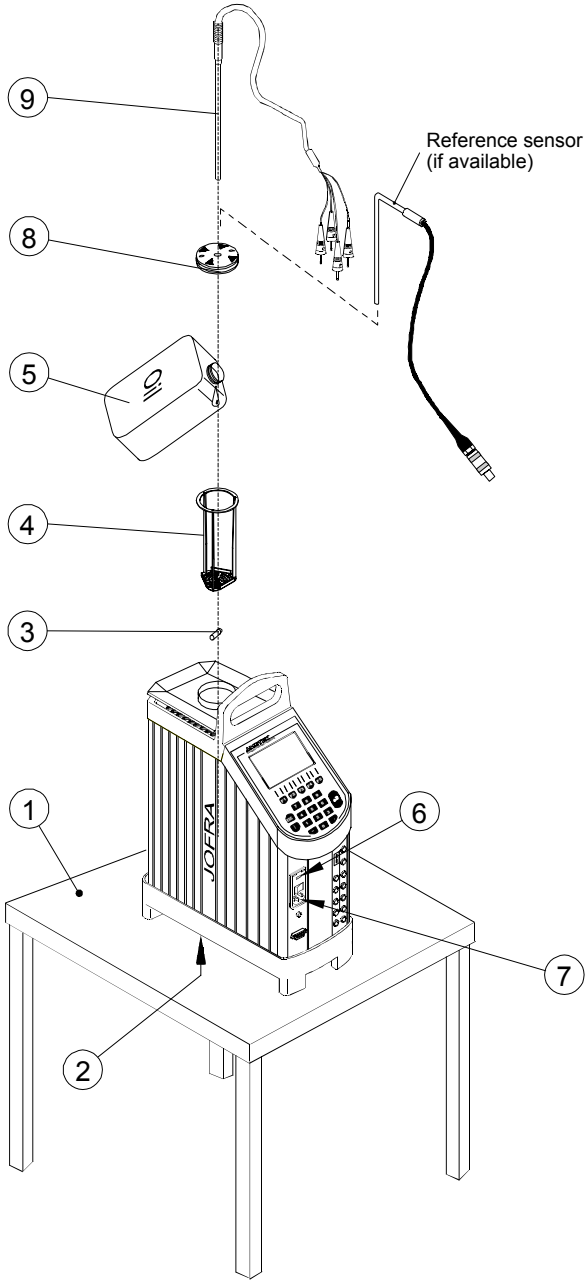


Fig. 2

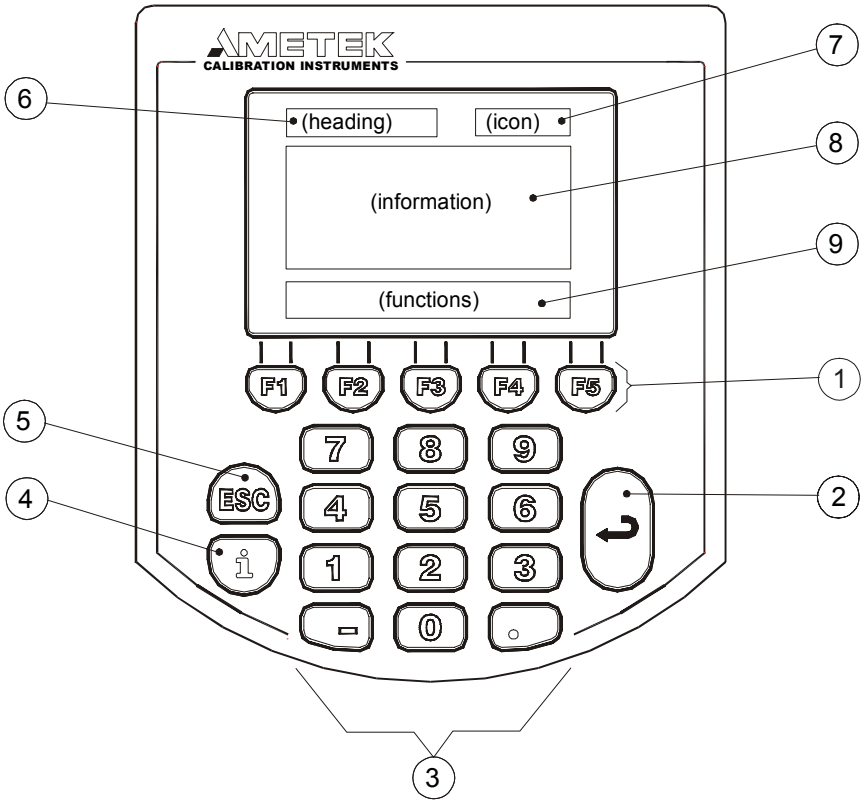

AMETEK
CALIBRATION INSTRUMENTS
(heading)
(icon)
(information)
(functions)
F1
F2
F3
F4
F5
7
8
9
4
5
6
1
2
3
0
ESC
1
2
3
4
5
6
7
8
9

Fig 3

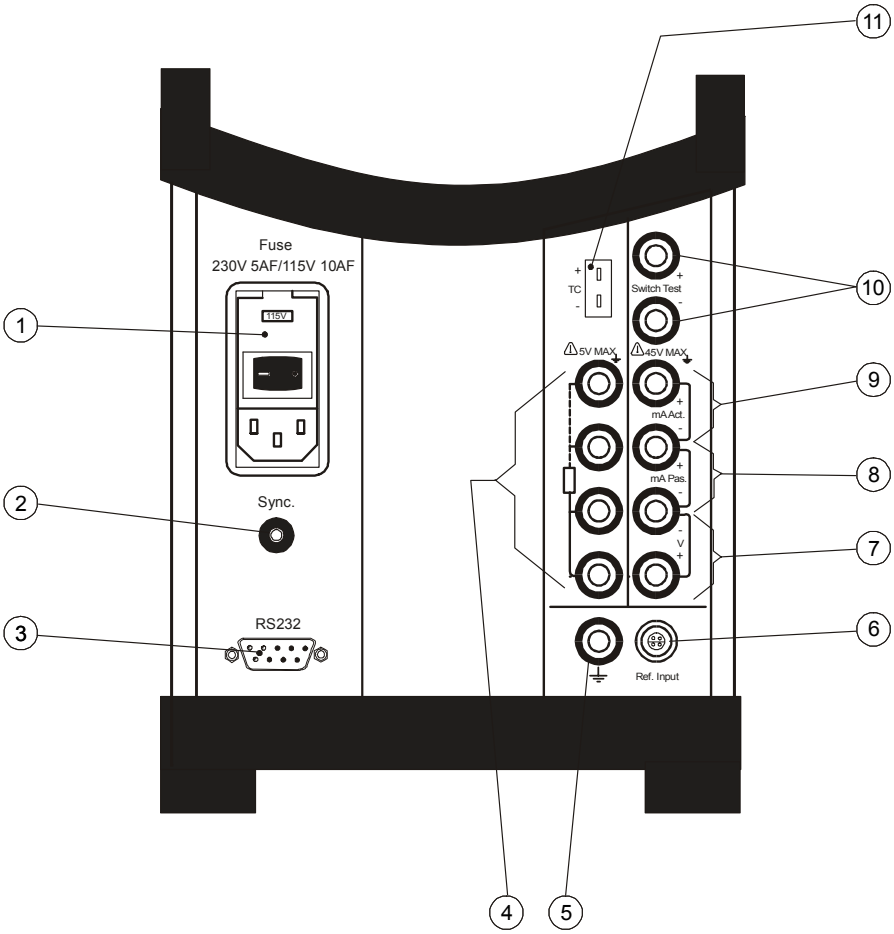

11
Fuse
230V 5AF/115V 10AF
115V
1
Sync.
2
RS232
3
TC
+
-
Switch Test
10
5V MAX
45V MAX
9
mA Act.
8
mA Pas.
7
V
6
Ref. Input
4
5

Fig 4

Calibrator Overview

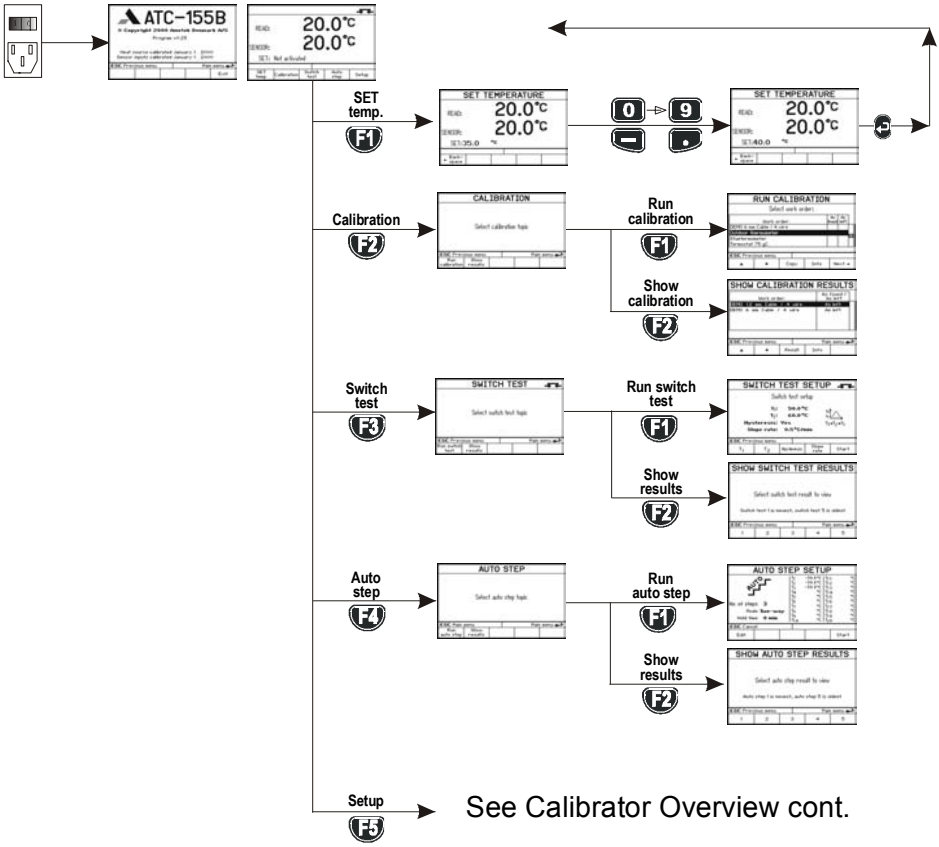


Fig 5

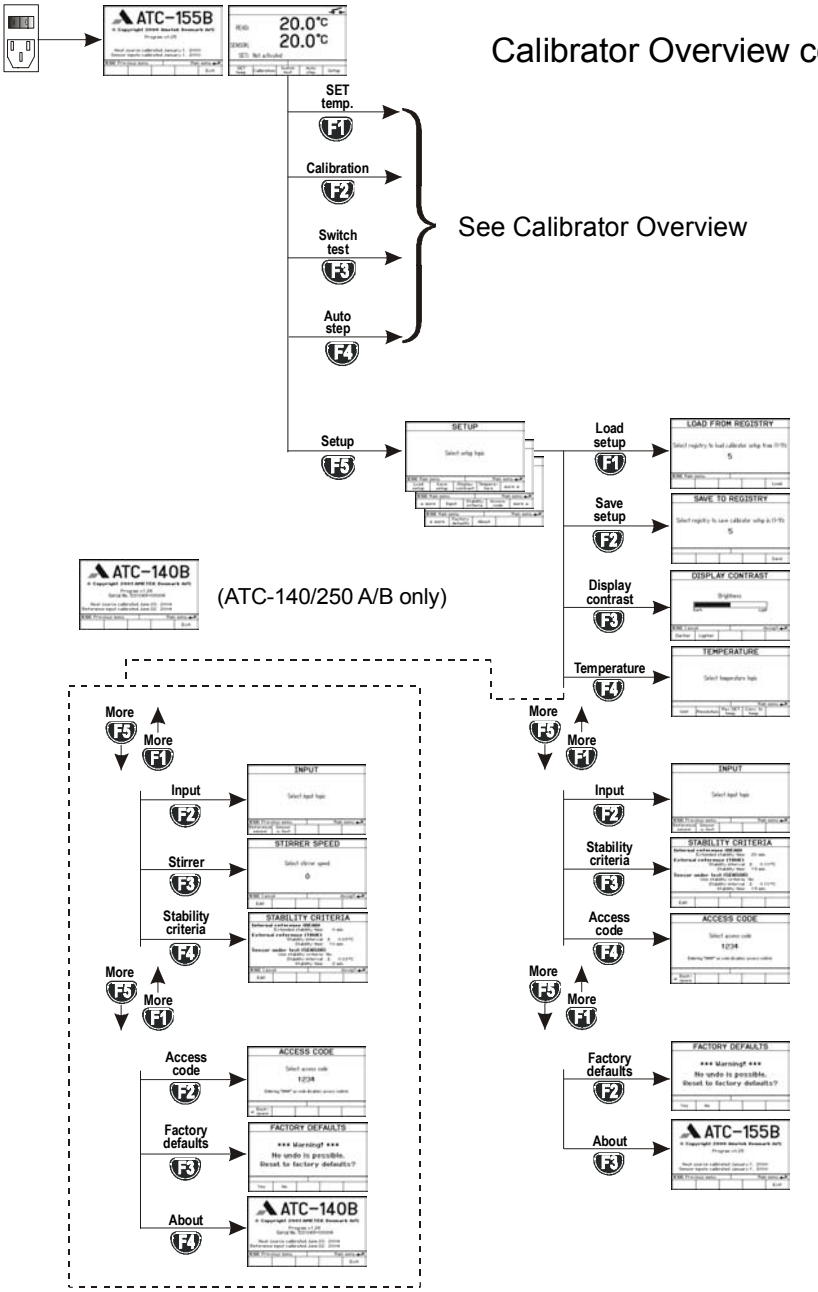

ATC-155B
20.0°C
20.0°C
Calibrator Overview cont.
SET temp.
F1
Calibration
F2
Switch test
F3
Auto step
F4
See Calibrator Overview
Setup
F5
SETUP
Load setup
F1
LOAD FROM REGISTRY
Save setup
F2
SAVE TO REGISTRY
Display contrast
F3
DISPLAY CONTRAST
Temperature
F4
TEMPERATURE
ATC-140B
(ATC-140/250 A/B only)
More
F5
More
F1
Input
F2
INPUT
Stirrer
F3
STIRRER SPEED
Stability criteria
F4
STABILITY CRITERIA
Access code
F2
ACCESS CODE
Factory defaults
F3
FACTORY DEFAULTS
*** Warning! ***
No undo is possible.
Reset to factory defaults?
About
F1
ATC-140B
ATC-155B

Fig 6

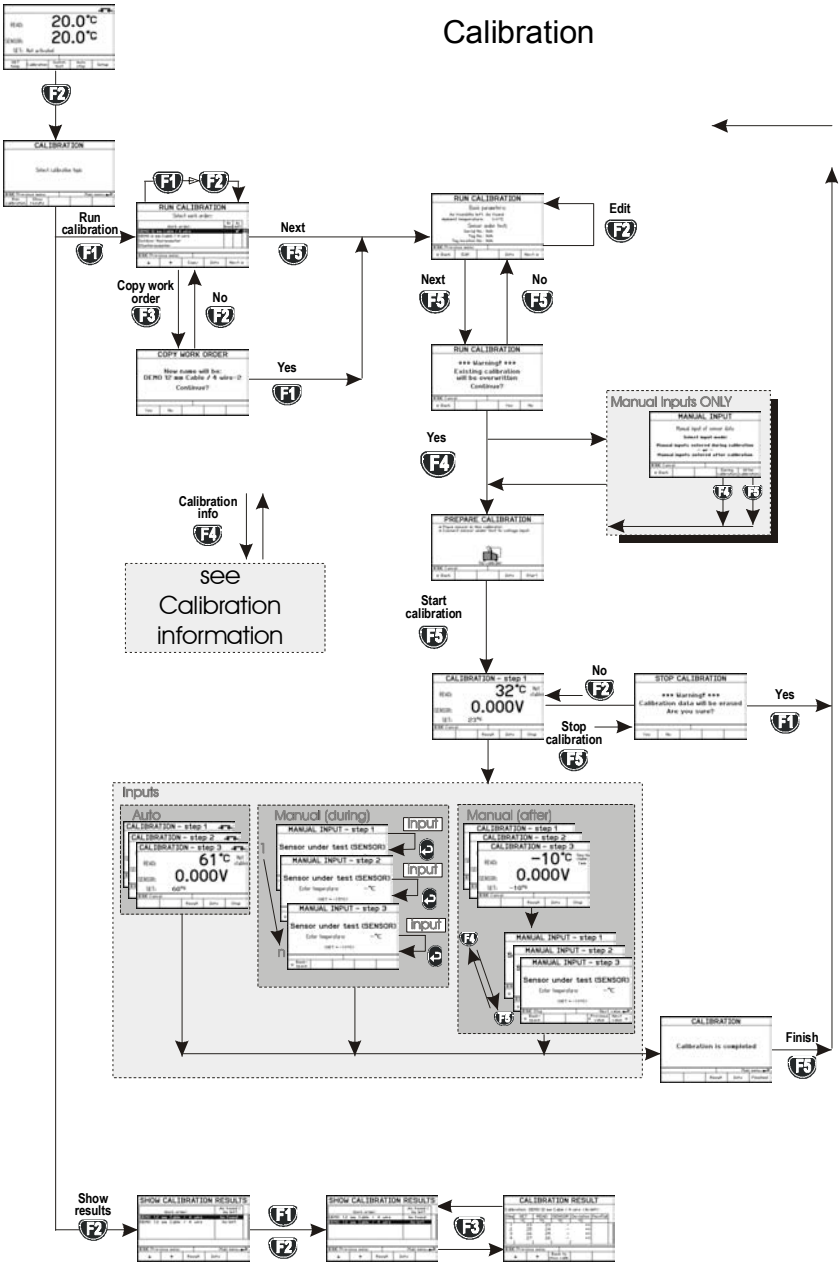

Calibration
Run calibration
Next
Edit
Copy work order
No
Yes
Calibration info
see Calibration information
Manual Inputs ONLY
Start calibration
Stop calibration
Inputs
Auto
Manual (during)
Manual (after)
Show results
Finish

Fig 7

Calibration information

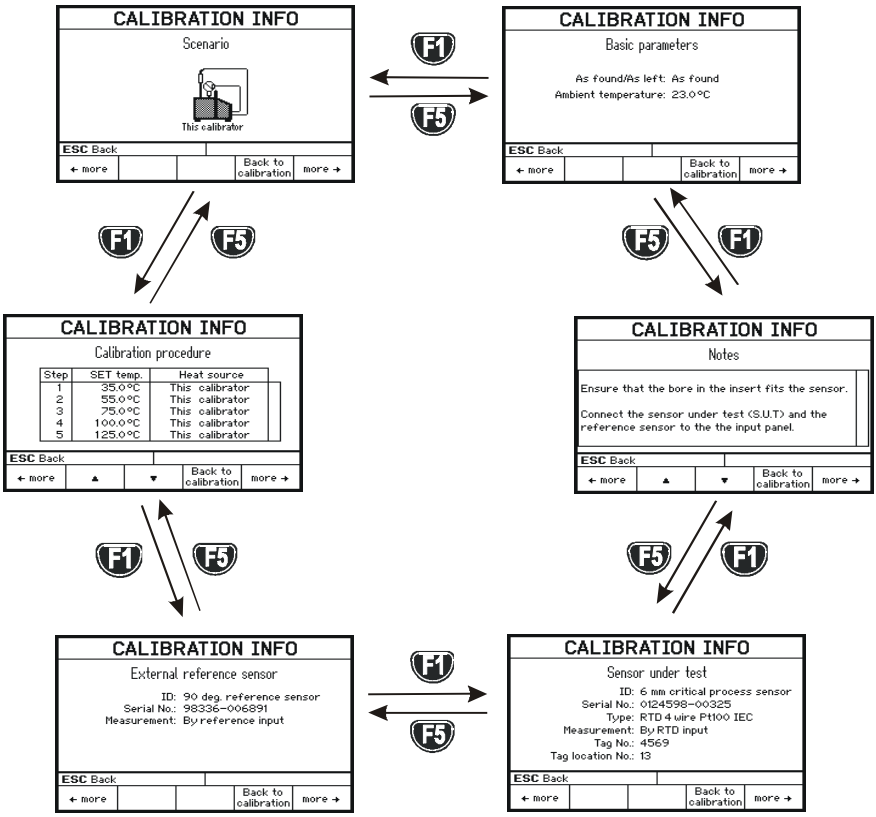


Fig 8

Switch Test Overview

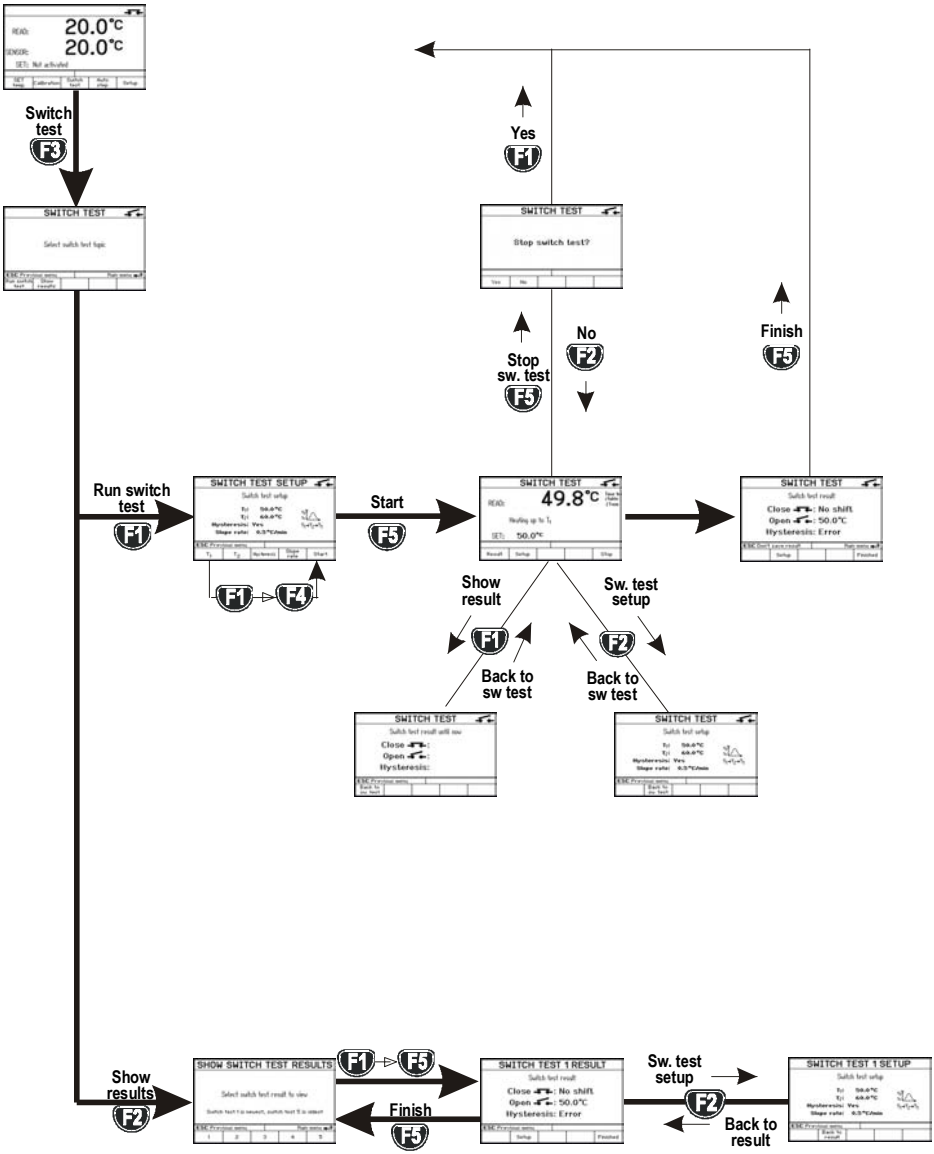


Fig 9

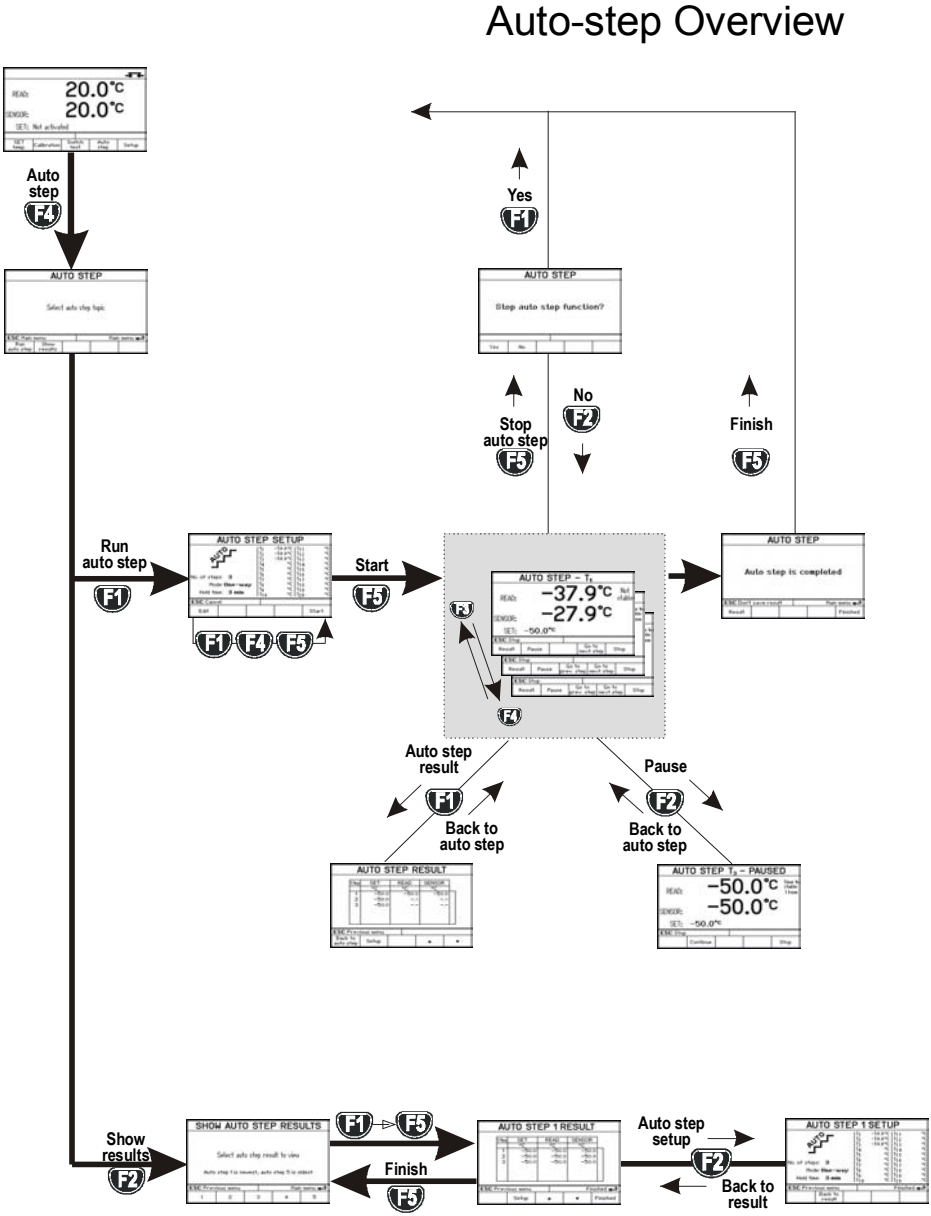
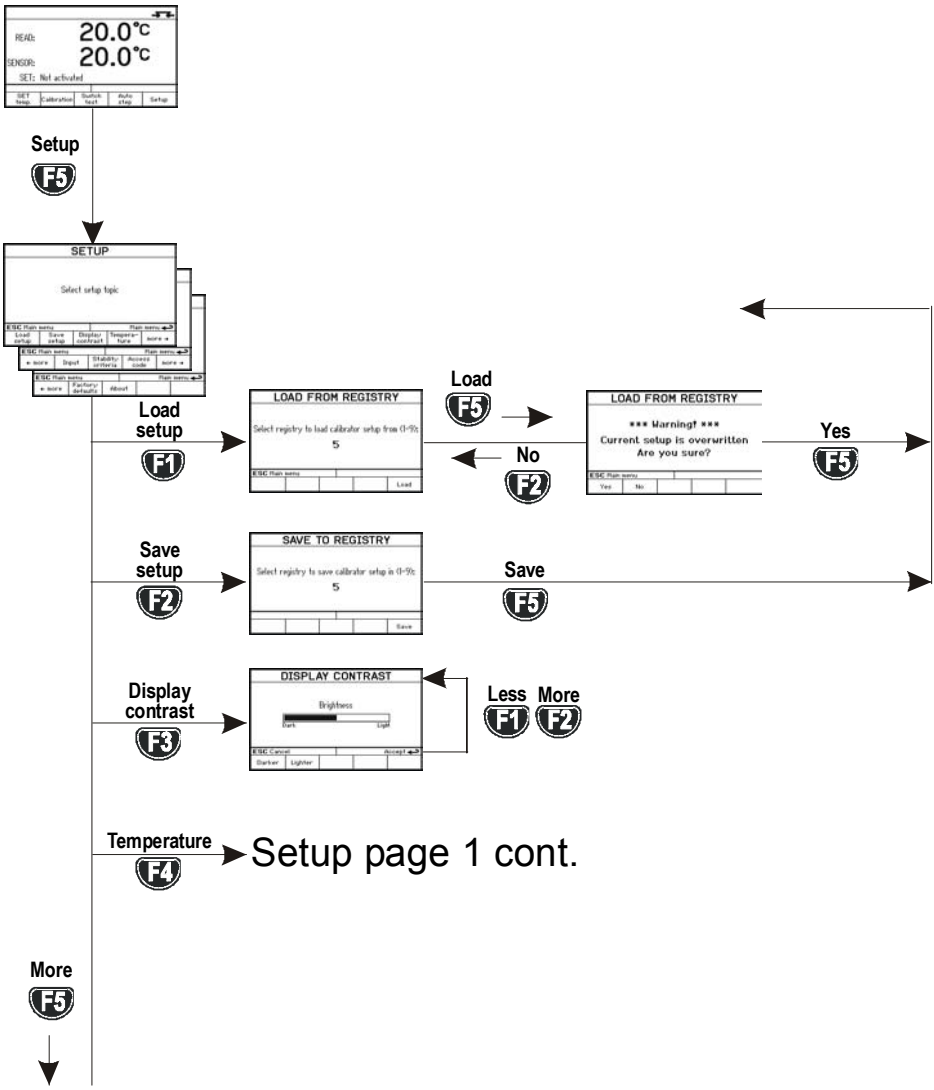

Auto-step Overview
20.0°C
20.0°C
Auto step
F4
AUTO STEP
Select auto step topic
Yes
F1
AUTO STEP
Stop auto step function?
Stop auto step
F5
No
F2
Finish
F5
Run auto step
F1
AUTO STEP SETUP
Start
F5
F1 F4 F5
AUTO STEP – T1
-37.9°C
-27.9°C
F3
F4
AUTO STEP
Auto step is completed
Auto step result
F1
Back to auto step
AUTO STEP RESULT
Pause
F2
Back to auto step
AUTO STEP T1 – PAUSED
-50.0°C
-50.0°C
Show results
F2
SHOW AUTO STEP RESULTS
F1 F5
Finish
F5
AUTO STEP 1 RESULT
Auto step setup
F2
Back to result
AUTO STEP 1 SETUP

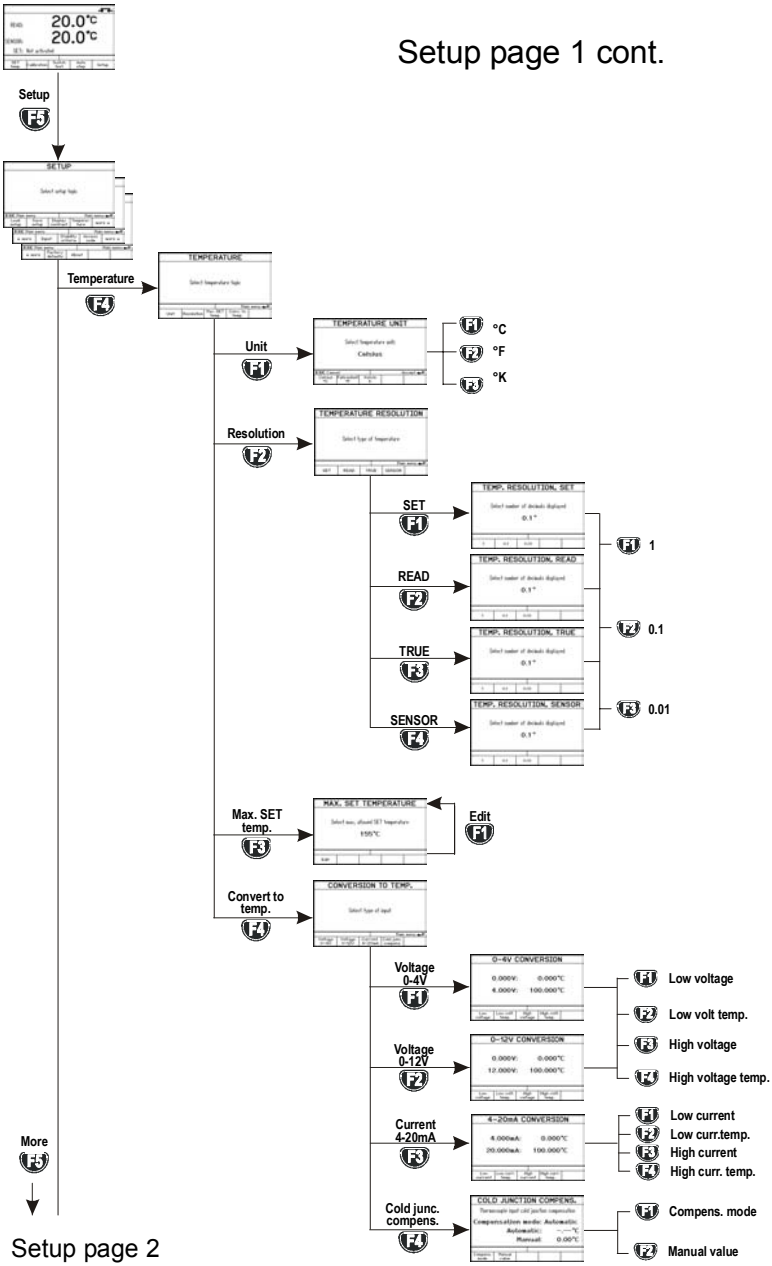
Fig 10

Setup page 1



Setup page 2

Fig 11



Setup page 1 cont.

Fig 12

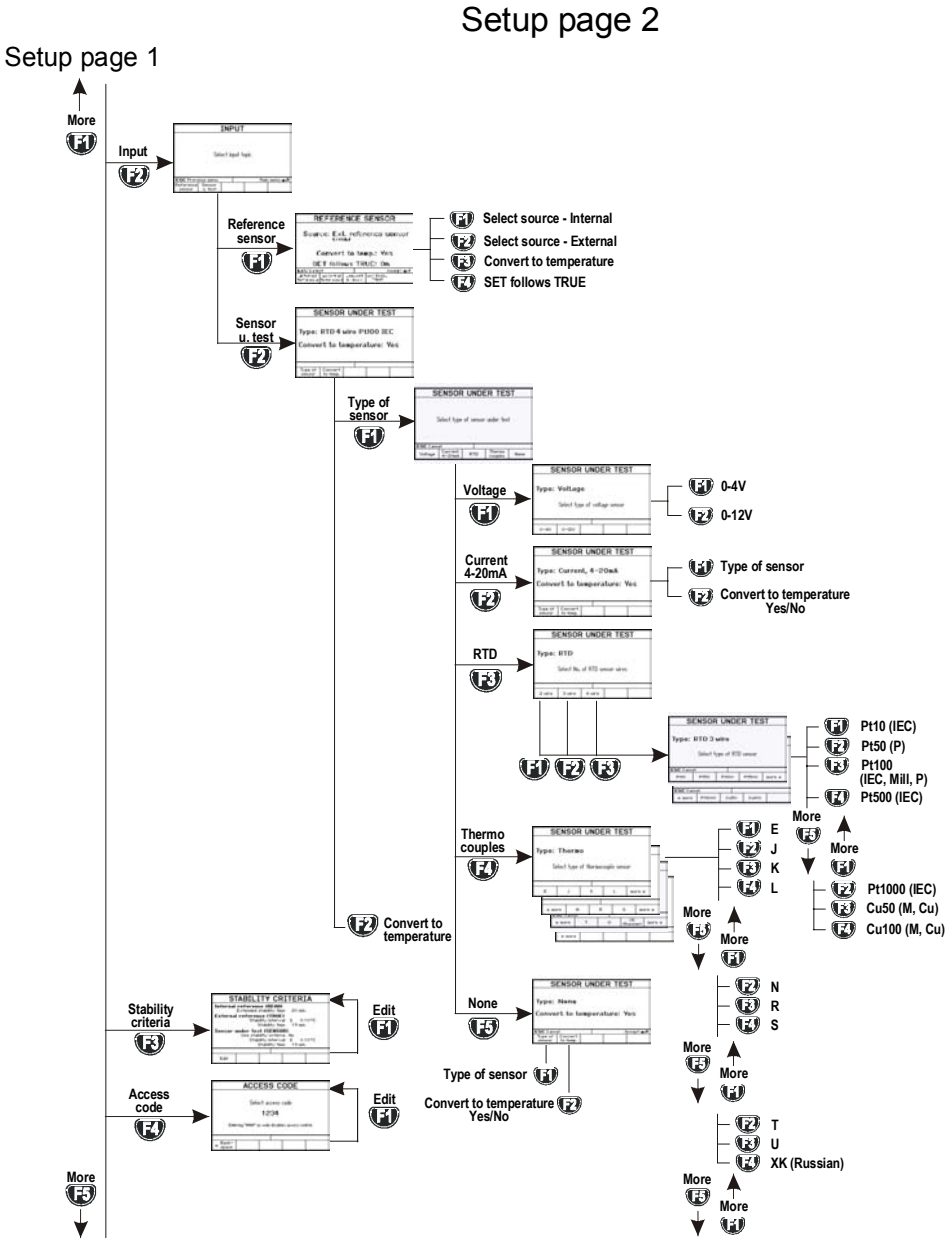

Setup page 2
Setup page 1
More
Input
Reference sensor
Select source - Internal
Select source - External
Convert to temperature
SET follows TRUE
Sensor u. test
Type of sensor
Voltage
0-4V
0-12V
Current 4-20mA
Type of sensor
Convert to temperature Yes/No
RTD
Pt10 (IEC)
Pt50 (P)
Pt100 (IEC, Mill, P)
Pt500 (IEC)
Thermo couples
E
J
K
L
Pt1000 (IEC)
Cu50 (M, Cu)
Cu100 (M, Cu)
N
R
S
T
U
XK (Russian)
Convert to temperature
None
Type of sensor
Convert to temperature Yes/No
Stability criteria
Edit
Access code
Edit
More
Setup page 3

Fig 13

Setup page 3

Setup page 2

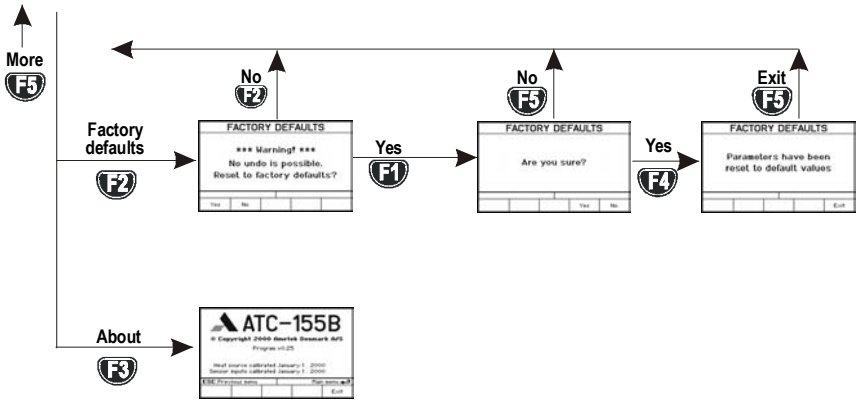
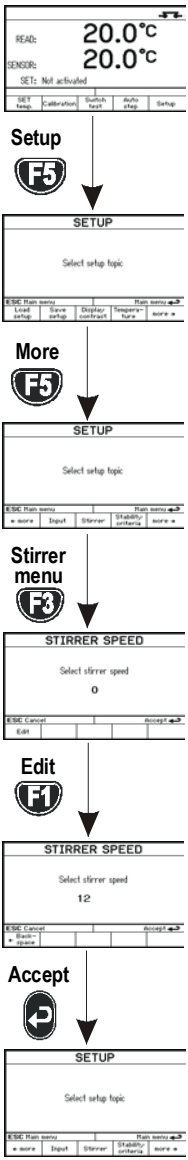


Fig 14

Stirrer speed



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1.0 Introduction

This user manual applies to the following instruments:

- **JOFRA ATC-125 A – Cooling calibrator**
- **JOFRA ATC-125 B – Cooling calibrator with input panel**
- **JOFRA ATC-140 A – Cooling calibrator**
- **JOFRA ATC-140 B – Cooling calibrator with input panel**
- **JOFRA ATC-156 A – Cooling calibrator**
- **JOFRA ATC-156 B – Cooling calibrator with input panel**
- **JOFRA ATC-157 A – Cooling calibrator**
- **JOFRA ATC-157 B – Cooling calibrator with input panel**
- **JOFRA ATC-250 A – Heating calibrator**
- **JOFRA ATC-250 B – Heating calibrator with input panel**
- **JOFRA ATC-320 A – Heating calibrator**
- **JOFRA ATC-320 B – Heating calibrator with input panel**
- **JOFRA ATC-650 A – Heating calibrator**
- **JOFRA ATC-650 B – Heating calibrator with input panel**

These instruments are temperature calibrators designed to calibrate temperature sensors and thermostats.

The ATC-125/156/157/320/650 A/B instruments are all designed as dry-block calibrators, where as the ATC-140/250 A/B instruments are designed to be used both as dry-block calibrators and liquid baths.

Read this manual carefully before using the instrument and ensure that all safety instructions and warnings are observed.

1.1 List of equipment received

When you receive the instrument, the following should be enclosed:

- 1 calibrator
- 1 mains cable
- 2 sets of test cables (2 black, 2 red – only B-versions)
- 1 CD-ROM containing software package “JOFRACAL”
- 1 AMETRIM-ATC/DTI software package to adjust the ATC series
- 1 RS232 serial cable
- 1 tool for insertion tube
- 1 traceable certificate (A versions)
  2 traceable certificates (B versions)
- 1 reference manual
- 1 user manual

ATC-125/156/157/320/650 A/B only

- 1 insertion tube – user specified (incl. reference bore)
- 3 pcs. insulation plugs for 6, 10, 16 mm sensors (ATC-125/156 A/B only)
  or
  3 pcs. insulation plugs for 5, 8, 11 mm sensors (ATC-157 A/B only)

ATC-140/250 A/B only (dry-block)

- 1 dry block kit – metric consisting of :
  - 1 insertion tube, multi-hole, metric, with 11 bores (incl. reference bore)
  - 1 pcs. insulation plug for multi-hole, metric (ATC-140 A/B only)

  or
- 1 dry block kit – inch consisting of :
  - 1 insertion tube, multi-hole, inch, with 11 bores (incl. reference bore)
  - 1 pcs. insulation plug for multi-hole, inch (ATC-140 A/B only)

ATC-140/250 A/B only (liquid bath)

- 1 liquid bath kit consisting of :
  - 1 sensor basket
  - 2 lids for transportation / calibration
  - 1 stirring magnet
  - 1 stirring magnet remover
  - 1 liquid drainage syringe
  - 1 silicone oil

2.0 Safety instructions

Read this manual carefully before using the instrument!

In order to avoid any personal injuries and/or damage to the instrument all safety instructions and warnings must be observed.

Disposal – WEEE Directive

These calibrators contain Electrical and Electronic circuits and must be recycled or disposed of properly (in accordance with the WEEE Directive 2002/96/EC).

Warning……

About the use:

- The calibrator **must not** be used for any purposes other than those described in this manual.
- The calibrator has been designed for **interior use only** and should **not be used in hazardous areas**, where vapour or gas leaks, etc. may constitute a danger of explosion.
- The calibrator **must** be kept free within an area of 20 cm on all sides and 1 metre above the calibrator.
- **NEVER** use heat transfer fluids such as silicone, oil, paste, etc. in the dry-block calibrators.
  These fluids may penetrate the calibrator and cause damage or create poisonous fumes.
- When cleaning the well, **REMEMBER** to wear goggles when using compressed air in the dry-block calibrator and cleaning oil in the liquid bath calibrator.

- The ATC-125 contains the gases R-1270 and R-704 under pressure. The calibrator must **under no conditions** be stored or operated at ambient temperatures above 60°C (140°F)

About the front panel:

- For B versions only, the sockets on the input module must **NEVER** be connected to voltages exceeding 5V for the TC/RTD sockets and 45V for the mA/V sockets proportional to ground. Thermostats must not be connected to any other voltage sources during test.

About the insertion tubes and sensor:

- **NEVER** leave hot insertion tubes which have been removed from the calibrator unsupervised – they may constitute a fire hazard.

  If you intend to store the calibrator in the optional aluminium carrying case after use, you **must** ensure that the instrument has cooled down to a temperature **below 100°C/212°F** before placing it in the carrying case.

About the fuses:

- The fuse box must not be removed from the power control switch until the mains cable has been disconnected.
- The two main fuses must be identical and correspond to the chosen voltage.

About the liquid bath:

- Ensure that the sensor is absolutely clean and dry as a few drops of water in the well (liquid bath) might cause a steam explosion.
- AMETEK Denmark A/S **does not** take any responsibility, if the well is filled with other fluids than the recommended.

- Heat transfer fluids must **only** be used in calibrators prepared as a liquid bath. If these fluids are overheated they will create noxious or toxic fumes. Proper ventilation must be used.
- Product information on the fluid must be carefully investigated before use.
- **Do not** handle hot oil.
- If the oil is heated beyond the flash point, it may constitute a fire hazard. Always set the max. SET temperature to a temperature 20°C below the flash point.
- **Do not pour** cold oil into a hot well – it might cause an explosion.
- **Do not pour** water or any other liquid into a bath filled with hot oil. E.g. only a few drops of water might cause a steam explosion, if poured into 250°C hot oil.

Caution – Hot surface

This symbol is engraved in the grid plate.

- **Do not touch** the grid plate, the well or the insertion tube when the calibrator is heating up – they may be very hot.
- **Do not touch** the lid or the spill tray when the calibrator is heating up – they may be very hot (liquid baths only).
- **Do not touch** the tip of the sensor when it is removed from the insertion tube/well – it may be very hot.
- **Do not touch** the handle of the calibrator during use – it may be very hot.

Caution – Cold surface

- If the calibrator has reached a temperature below 0°C/32°F, ice crystals may form on the insertion tube and on the well. This, in turn, may cause verdigris to form on the material.
  To prevent this from happening, the insertion tube and the well must be dried. This is done by heating up the calibrator to min. 100°C/212°F and any water left will evaporate.
  Remove the insulation plug while heating up.

  It is very important that humidity in the well and insertion tube is removed to prevent corrosion and frost expansion damages.
- Do not touch the well or insertion tube when these are below 0°C/32°F – they can create frost-bites.

Caution…

About the use:

- **Do not** use the instrument if the internal fan is out of order.

About the liquid bath:

- Be careful **not to overfill** the well with oil.

  The oil level rises several centimetres when the temperature is rising to maximum.
- Do not attempt to remove hot oil overflow with the liquid drainage tube, as it might melt.
- When heated to high temperatures the liquid bath calibrator should be placed under an exhaust hood to remove any vapors given off by the oil.

About the insertion tube and sensor:

- The tip of the sensor should rest at the bottom of the sensor basket for optimum results (liquid baths only).

- If the sensor-under-test is short, be careful **not to** submerge the handle or wire inlet in the oil, as this might damage the sensor (liquid baths only).
- The insertion tube must **always** be removed from the calibrator after use.
  The humidity in the air may cause corrosion oxidation on the insertion tube inside the instrument. There is a risk that the insertion tube may get stuck if this is allowed to happen.

Note…

The product liability **only** applies if the instrument is subject to a manufacturing defect. This liability becomes void if the user fails to follow the instructions set out in this manual or uses unauthorised spare parts.

3.0 Operating the calibrator

3.1 Before use

The ATC-B-version has a precision reference input. To achieve the high precision, a set of sensor coefficients relating to the specific sensor must be present in the ATC. Before use of the ATC, ensure that the correct coefficients in the ATC are equal to those from the sensors calibration certificate. This is done with the PC software JOFRACAL included on the CD. Please read how to do in the chapter “Reference Sensors” in the JOFRACAL user manual on the CD.

Warning

- The calibrator **must not** be used for any purposes other than those described in this manual.
- The calibrator has been designed for **interior use only** and should **not be used in hazardous areas**, where vapour or gas leaks, etc. may constitute a danger of explosion.
- For B versions only, the sockets on the input module (fig. 3) must **NEVER** be connected to voltages exceeding 5V for the TC/RTD sockets and 45V for the mA/V sockets proportional to ground. Thermostats must not be connected to any other voltage sources during test.
- **NEVER** use heat transfer fluids, such as silicone, oil, paste, etc. to help inserting sensors in dry-block calibrators. These fluids may penetrate the calibrator and cause damage or create poisonous fumes.
- The calibrator **must** be kept free within an area of 20 cm on all sides and 1 metre above the calibrator.
- The ATC-125 contains the gases R-1270 and R-704 under pressure. The calibrator must **under no conditions** be stored or operated at ambient temperatures above 60°C (140°F).

3.1.1 Setting up the dry-block calibrator

Follow the instructions below before using the calibrator (cf. fig. 1a)

1. Place the calibrator on an even horizontal surface where you intend to use it (pos. 1).

Caution…

Do not use the instrument if the internal fan is out of order. Ensure a free supply of air to the internal fan located at the bottom of the instrument (pos. 2).

2. The area around the calibrator should be free of draught, dirt, flammable substances, etc.
3. Check that the voltage setting, shown on the power control switch (pos. 3), is identical to the mains voltage used.
4. Plug in the mains cable below the power control switch (pos. 4) and check that the earth connection is present.
5. Select an insertion tube (pos. 5) with a boring diameter matching the sensor (pos. 6) to be calibrated. Ensure that both the well and the insertion tube are clean. Insert the tube into the well.
6. Place the sensor (pos. 6) in the insertion tube (pos. 5) as shown in fig. 1a.

3.1.2 Setting up the liquid bath calibrator

Follow the instructions below before using the calibrator (cf. fig. 1b).

1. Place the calibrator on an even horizontal surface in that place where you intend to use it. Place it in a way that will minimize the risk of tilting (pos. 1).
   It is recommended to cover the surface with a disposable cover in order to protect the surface against the silicone oil, if spilled.
   It is also recommendable to have a sufficient amount of disposable paper towels within reach.

Caution…

Do not use the instrument if the internal fan is out of order. Ensure a free supply of air to the internal fan located at the bottom of the instrument (pos. 2).

2. The area around the calibrator should be free of draught, dirt, flammable substances, etc.

3. Place the parts from the liquid bath kit in the well in the following order :

   A. stirring magnet (pos. 3)

   B. sensor basket (pos.4)

   C. silicone oil (pos. 5)
   The recommended oil volume to a given test temperature is listed in the tables below. The recommended volumes must be adjusted to the actual job.

ATC-250 A/B

For recommended 50 cSt oil

0°C - 50°C	100%
50°C - 100°C	95%
100°C - 150°C	90%
150°C - 200°C	85%
200°C - 250°C	80%

ATC-140 A/B

For recommended 10 cSt oil

-20°C - 50°C	100%
50°C - 100°C	95%
100°C - 140°C	90%

Warning

- **Do not pour** cold oil into a hot well – it might cause an explosion.
- AMETEK Denmark A/S **does not** take any responsibility, if the well is filled with other fluids than those recommended.

Caution…

- Be careful **not to overfill** the well with oil.

  The oil level rises several centimetres when the temperature is rising to maximum.

- **Do not** attempt to remove overflow of hot oil with the liquid drainage syringe, as it might melt.

4. The sensor basket (pos. 4) is marked with an optimum oil level mark (100%). When filling the well with oil and placing the sensors, this mark must **never** be exceeded.

5. Check that the voltage setting, shown on the power control switch (pos. 6), is identical to the mains voltage used.

6. Plug in the mains cable below the power control switch (pos. 7) and check that the earth connection is present. Switch on the calibrator.

7. Follow the procedure section 3.7 to access the Stirrer control menu.

8. Follow the procedure section 3.8 to select the SET-temperature according to the tables above.

9. Carefully monitor the oil level in the well, as the temperature rises, to prevent overflow.

10. Holes with a boring diameter matching the sensors to be calibrated must be drilled into the lid (pos. 8) before using it.

11. Place the calibration lid (pos. 8) onto the well, when the SET-temperature has been obtained.

Warning

Ensure that the sensor is absolutely clean and dry as a few drops of water might cause a steam explosion.

12. Place the sensor (pos. 9) vertically into the well using the optional support rod set for sensors for a correct position during calibration.

Caution…

- The tip of the sensor should rest at the bottom of the sensor basket for optimum results.
- If the sensor under test is short, be careful **not to** submerge the handle or wire inlet in the oil, as this might damage the sensor.

13. Start the calibration following the calibration procedure in this manual.

3.2 During use

Warning…(liquid baths only)

- If the oil is heated beyond the fire point, it may constitute a fire hazard. Always set the max. SET temperature to a temperature 20°C below the flash point.
- **Do not pour** water or any other liquid into a bath filled with hot oil. E.g. only a few drops of water might cause a steam explosion, if poured into 250°C hot oil.

Caution – Hot surface

This symbol is engraved in the grid plate.

- **Do not touch** the grid plate, the well or the insertion tube when the calibrator is heating up – they may be very hot.
- **Do not touch** the lid or the spill tray when the calibrator is heating up – they may be very hot (liquid baths only).
- **Do not touch** the tip of the sensor when it is removed from the insertion tube/well – it may be very hot.
- **Do not touch** the handle of the calibrator during use – it may be very hot.

Caution… (liquid baths only)

- It is vital that the stirring magnet is in place and spinning before any calibration attempts. The spinning magnet ensures optimum temperature homogeneity in the oil.
- It is strongly recommended to leave the lid on during calibration. Calibration without the lid may affect the temperature stability and homogeneity.
- When heated to high temperatures, the liquid bath calibrator should be placed under a exhaust hood to remove any vapors given off by the oil.

3.3 Keyboard

The keys on the keyboard activate the following functions (cf. fig. 2):

Pos.	Description
①	**SOFT KEYS** used to select menu options displayed in the LCD.
②	**ENTER KEY** used to accept selected options or entered values.
③	**NUMERIC KEYS** used to type in values.
④	**INFORMATION KEY** used to display the status of the parameters involved with the function currently selected.
⑤	**ESC KEY** (escape key) used to cancel a selection/edit or return to previous menu.

3.4 Display

The four separate areas within the display are used to indicate the following (cf. fig. 2):

Pos.	Description
⑥	Informs you, by providing a heading, of the current function selected.
⑦	Indicates, by use of an icon, the status of the calibrator.
⑧	Provides the bulk of information and data available within the selection.
⑨	Shows you the functions of the soft keys.

3.5 Connections

The instrument is designed for the following connections (cf. fig. 3):

Pos.	Description
①	Power control switch with a cable connection and on/off switch. It also contains the main fuse. See section 4.0 for information on how to change the fuses and to adjust the voltage setting of the power control switch.
②	Connection for synchronization output. Relay which is switching, when temperature stability is achieved.
③	Connection for RS232 communication. **Note** that all PC-equipment, which are connected to the calibrator must observe the directive IEC950.
④	Input for RTD sensor (2, 3 and 4 wire).
⑤	Connection to chassis (earth/ground).
⑥	Input for reference sensor.
⑦	Voltage input.
⑧	Passive mA input.
⑨	Active mA input with 24V supply for transmitter.
⑩	Connection for thermostat test. **Note** that this connection is for dead switches.
⑪	TC connection for thermocouples.

One of the inputs either ④, ⑦, ⑧, ⑨ or ⑪ can be selected displaying the “SENSOR” temperature in the setup and ⑥ can be displayed as “TRUE” temperature.

Note: Only the sensor type, which is to be tested, should be connected to the input panel.

3.6 Calibrator functions – overview

The instrument's functions are divided into groups. See figs. 4 and 5.

3.7 Setting the speed level of the stirrer (liquid baths only)

Follow the instructions to set the speed level of the stirrer (cf. fig. 14):

☞ Press F3 to access the Set-Up menu.

☞ Press F3 for more choices.

☞ Press F3 to access the Stirrer menu.

☞ Press F1 to edit the speed level of the stirrer.

It is now possible to choose a speed setting between 0 and 50. Normal setting is between 10 and 15.

☞ Press ↵ to accept the value and return to the main menu screen.

Caution…

If the speed level chosen is too high, the magnet will fall of and there will be no stirring in the oil. With no stirring of the oil, temperature gradients will emerge in the bath, which will again affect the result of the calibration.

3.8 Selecting the SET temperature

Follow the instructions to define the SET temperature (cf. fig. 4):

☞ Press F1. A cursor appears in the SET temperature field.

☞ Use the numeric keys to enter a new value, or F1 to edit the existing value.

☞ Press E to accept the value and return to the main menu screen.

The calibrator now starts working towards the new SET temperature.

3.9 Calibration

Note…
This Calibration function is for B versions only.

This function enables you to perform automatic calibrations of multiple temperature sensors, using identical or similar settings that are defined in work orders created in the "JOFRACAL" PC program.

For ease of use, the following instructions (cf. fig. 6) are split into two sections:

3.9.1 Running a calibration

☞ Press F2 to select the Calibration menu.

Note: Calibration information is available in several places throughout the calibration menus using F4.

☞ Press F1 to select the Run calibration menu.

☞ Use F1 and F2 to scroll through the list and highlight an existing work order.

☞ Press F5 to continue the calibration using the highlighted work order
or,
Press F3 to create a copy of the work order. Then press F1 to accept the new name.

☞ Press F5 to continue the calibration without editing the basic parameters
or,
Press F2 to start the editor. Make the necessary changes, exit the editor and continue the calibration.

If the sensor under test is a thermocouple sensor and the manual compensation mode is selected in work orders, a cold junction temperature must be defined.

☞ Press F4 if you wish to overwrite the existing calibration and continue.

If the work order is defined as a manual input, use:

- F4 – To enter values during the calibration.
- F5 – To enter values after the calibration.

☞ Follow the instructions on screen to connect the sensors and press F5 to start the calibration.

Note: a calibration can be stopped at any time, but this will erase all the calibration data.

Follow the instructions on screen:

- To reposition the sensors (when an external manual heat source is used).
- To enter the step values (when manual input is required).

☞ When the calibration is complete, press F5 or ⏎ to store the results in the calibrator.

3.9.2 Showing calibration results

☞ Press F2 to select the Calibration menu.

☞ Press F2 to select the Show calibration menu.

☞ Use F1 and F2 to scroll through the list and highlight a specific work order.

☞ Press F3 to display the calibration details for the selected work order.

The calibration results can be uploaded with the "JOFRACAL" PC program. This enables you to print out the results on a certificate.

3.10 SWITCH TEST

Note…

This Switch test function is for B versions only.

Switch test automatically locates the switch temperature of a thermostat.

Three parameters are required:
- Start temperature (T_1)
- End temperature (T_2)
- Rate of change in temperature (slope rate).

Hysteresis of a thermostat can also be obtained here.

For ease of use, the following instructions (cf. fig. 8) are split into two sections:

3.10.1 Running a switch test

☞ Press F3 to select the Switch test menu.

☞ Press F1 to select Run switch test.

☞ Press a function soft key (F1 – F4) to enable the editor:
(Note that T_1 can be greater than T_2)

- F1 – To edit the first set temperature (T_1).
- F2 – To edit the second set temperature (T_2).
- F3 – To determine hysteresis, toggle between "Yes" (a two temperature measurement) and "No" (a single temperature measurement).
- F4 – To edit the slope rate. The permitted range is 0.1 – 9.9°C/min./0.2 – 17.8°F/min.
  Note: the slope rate should be set so that the thermostat sensor can follow the temperature in the calibrator's well.

Make the necessary changes and exit the editor by pressing ↩.

☞ Press F5 to start the switch test.

While the switch test is in progress, you can press:

- F1 – To show the current switch test results.
- F2 – To review the switch test setup (no editing is possible).
- F5 – To stop the switch test at any time.

☞ When the switch test is complete, press F5 or ↩ to store the results in the calibrator and return to the Switch test menu.

3.10.2 Showing switch test results

Two types of switch test results are available:

- Results during a switch test.
- Results of a finished switch test.

Results during a switch test

☞ Press F1 to select Show result.

This shows the results that are currently available. These results change as the test progresses.

☞ Press F1 to return to the switch test.

Results of a finished switch test

☞ Press F3 to select the Switch test menu.

☞ Press F2 to select Show result.

☞ Press a function soft key (F1 – F5) to select the results for one of the last five tests. The data in the information field is the same as that displayed at the end of the switch test.

3.11 AUTO STEP

Auto step is used to step automatically between a range of different calibration temperatures.

For ease of use, the following instructions (cf. fig. 9) are split into two sections:

3.11.1 Running an auto step calibration

☞ Press F3 to select the Auto step menu.

☞ Press F1 to select Run auto step.

☞ Press F1 to enable the editor to change the following values:

- **No of steps**: the number of temperature steps per direction ($T_1 \rightarrow T_x$). When a Two-way mode is selected,

the same number of steps are used for the second direction (T_x➡T_1).

- **Mode**: toggle between "One-way" and "Two-way".
- **Hold time**: defines the time (in minutes) the temperature is maintained (after it is stable) for each step.
- **T** step values: must be set within the sensors permitted range.

Make the necessary changes and exit the editor by pressing ⏎.

☞ Press F5 to start the Auto step test.

While the step test is in progress, you can press:
F1 – To review the Auto step result (no editing is possible).
F2 – To pause the test.
F3 and F4 – Force the test to jump a step (previous or next), regardless of the temperature step's stability.
F5 – To stop the Auto step test.

☞ When the Auto step test is complete the results are displayed. Press F5 or ⏎ to finish the test and store the results in the calibrator.

3.11.2 Showing auto step test results

☞ Press F4 to select the Auto step menu.

☞ Press F2 to select Show results.

☞ Press a function soft key (F1 – F5) to select one of the last five Auto step tests stored in the calibrator. The data in the information field is the same as that displayed at the end of the Auto step test.

3.12 SETUP

The setup of this calibrator is divided into nine functions. Access to these functions is via three separate setup pages. The function keys F1 and F5 are used to navigate through these pages and functions (cf. figs. 10, 11, 12 and 13).

For ease of use, the instructions are divided into 9 sections, each representing a function.

☞ Press F5 to select the Setup menu.

3.12.1 Loading a setup

(cf. fig. 10)

☞ Press F1 (setup page 1) to select Load setup.
Note that loading a setup results in all the parameters in the setup menu being overwritten.

☞ Use the keyboard to select a calibrator setup number (1–9).

☞ Press F5 to load the selected setup.
A warning informs you that the active setup will be overwritten.

☞ Press F1 if you are sure you want to overwrite the existing setup and return to the Setup menu.

3.12.2 Saving a setup

(cf. fig. 10)

☞ Press F2 (setup page 1) to select Save setup to registry.

☞ Use the keyboard to select a register number (1–9).

☞ Press F5 to save the current setup in the selected register and return to the Setup menu.

3.12.3 Adjusting the display contrast

(cf. fig. 10)

☞ Press F3 (setup page 1) to select Display contrast.

☞ Press F1 to make the display darker or F2 to make the display lighter.

☞ Press ↵ to accept the new setting and return to the Setup menu.

3.12.4 Altering the temperature display settings

(cf. fig. 11)

☞ Press F4 (setup page 1) to select the Temperature menu.

Use the function soft keys to set the parameters displayed.

Setting the temperature units

☞ Press F1 to select Unit.

☞ To select the temperature units, press:
F1 - To select Celsius.
F2 - To select Fahrenheit.
F3 - To select Kelvin.

☞ Press ↵ to accept the new setting.

Setting the temperature resolution
(cf. fig. 11)

☞ Press F2 to select Temperature resolution.

☞ Press a function soft key to select the temperature type:
F1 - To select SET.
F2 - To select READ.
F3 - To select TRUE.
F4 - To select SENSOR.

☞ Press a function soft key to set the resolution.

F1 – 1° resolution.
F2 – 0.1° resolution.
F3 – 0.01° resolution.

☞ Press ↵ to accept the new setting and return to the Temperature resolution menu.

Setting the max. SET temperature
(cf. fig. 11)

☞ Press F3 to select Max. SET temperature.

☞ Press F1. A cursor appears in the Max. SET temperature value.

☞ Use the numeric keys to enter a new value or press F1 to edit the existing value.

☞ Press ↵ to accept the new setting and return to the Max. SET temperature menu.

Converting electrical inputs to temperatures
(cf. fig. 11)

☞ Press F4 to select the Conversion to temp. menu.

Setting voltage or current input conversions from the electric signal to a temperature reading.

☞ Press a function soft key (F1 – F3) to select the type of input.

☞ Press a function soft key to select a parameter and start the editor.

F1 – Low input (voltage or current).
F2 – Low input temperature that corresponds to the low level electrical signal.
F3 – High input (voltage or current).
F4 – High input temperature that corresponds to the high level electrical signal.

☞ Use the numeric keys to set a new value or press F1 to edit the existing value.

☞ Make the necessary changes and press ↩ to accept the new setting(s), and to return to the Conversion to temperatures menu.

Setting cold junction compensation temperatures

☞ Press F1 to select Cold junction compensation.

☞ Press a function soft key to enable the editor:

F1 - To select compensation mode; toggle between Automatic and Manual.
Note: when the automatic mode is selected, the calibrator measures the temperature in the T/C connector and uses this for the cold junction compensation of the thermocouple.

F2 - To define a Manual temperature for the cold junction compensation. This can be used when an external cold junction temperature can be established.

☞ Make the necessary changes and press ↩ to accept the new setting(s) and return to the Cold junction compensation menu.

3.12.5 Setting the sensor input parameters (B-versions only)

(cf. fig. 12)

☞ Press F2 (setup page 2) to select Input.

Selecting the reference sensor input

☞ Press F1 to select Reference sensor.

☞ Press a function soft key to enable the editor:

F1 - To select Internal reference source. Results in displaying the reference as READ.

F2 - To select External reference source (reference input on front panel). Results in displaying the reference as TRUE and the Internal reference is displayed as READ (a secondary value).

Check that the displayed serial number is the same, as on the reference sensor – otherwise the sensors coefficients need to be downloaded to the ATC. This is done with the PC software JOFRACAL included on the CD. Please read how to do in the chapter “Reference Sensors” in the JOFRACAL user manual on the CD.

F3 - To change Convert to temperature function.

Yes sets the readout of the External reference as a temperature.

No sets the readout of the External reference in Ω values.

F4 - To change SET follows TRUE; toggle between On and Off.

This function enables you to reach an exact TRUE temperature measured by the External reference sensor.

Note that when ON is selected, the calibrator will let the temperature be set by the TRUE temperature. This means it will take longer before the calibrator indicates stable.

Note: Set follows TRUE is only relevant when the External reference sensor is displayed in temperature units.

☞ Make the necessary changes and press ↵ to accept the new setting(s) and return to the Input menu.

Note that when SET follows TRUE is on, it is indicated by a -symbol at the SET temperature.

Selecting the input from the sensor under test

☞ Press F2 to select Sensor under test.

☞ Press F1 to select type of sensor.

☞ Press a function soft key to select a specific type of sensor:
- F1 – For voltage sensors (0 – 4V or 0 – 12V).
- F2 – For a 4 – 20mA sensor.
- F3 – For RTD sensors (Pt10, Pt50, Pt100, Pt500, Pt1000 Cu50 or Cu100).
- F4 – For thermocouple sensors (E, J, K, L, N, R, S, T, U or XK).
- F5 – For None (no sensor connected).

☞ Press a function soft key to select a specific sensor and return to the Sensor under test menu, which now displays the selected sensor and the convert to temperature status.

☞ Press F2 to select Convert to temperature. This toggles between Yes (where inputs are converted to temperatures) and No (where no conversion is made).

☞ Press ⏎ to accept the new settings and return to the Input menu.

3.12.6 Altering stability criteria

(cf. fig. 12)

☞ Press F3 (setup page 2) to select Stability criteria.

The parameters displayed depend on the sensor selected. When none of the parameters displayed are active, then the calibrator's internal reference criteria provide the "time to stable" value. Stability values defined here are added to the internal reference stability criteria.

☞ Press F1 to select the editor.

- Stability Time and Extended Stability Time can be set (in minutes) using integers from 0 – 120.
- Stability intervals can be set in 0.01° steps from ±0.01 – ±99.99.

☞ Make the necessary changes and press ↵ to accept the new setting(s) and exit the editor.

3.12.7 Setting the access code

The following features can be protected by an access code:
- Resetting the calibrator to Factory default settings.
- Setting the Maximum SET Temperature.
- Editing the Access code while it is enabled.

(cf. fig. 12)

☞ Press F4 (setup page 2) to select Access code.

☞ Press F1 to start the editor.

☞ Use the numeric keys to type in a value from 0000 to 9999. (Typing 0000 disables the access code function.)

☞ Press ↵ to accept the new access code and exit the editor.

3.12.8 Resetting the calibrator setup to factory defaults

Resetting to the factory default settings changes the setup to the initial settings (cf. fig. 13)

☞ Press F2 (setup page 3) to restore Factory defaults.

Caution…
By pressing F1 (yes) the following will be deleted :

- Work orders
- Setup parameters
- Autostep results
- Switch test results

☞ Press F1 to restore Default factory settings.

3.12.9 About the calibrator

(cf. fig. 13)

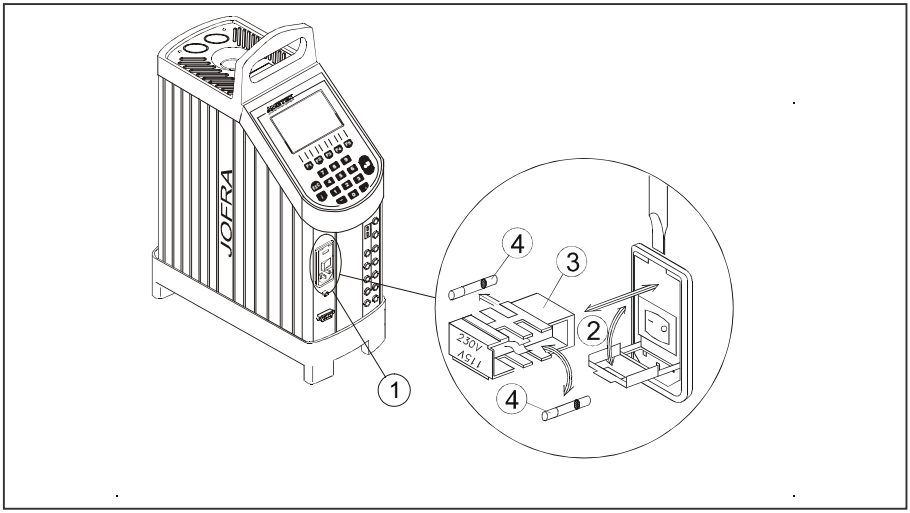
☞ Press F3 (setup page 3) to select About.
This informs you about the calibrator type, the software version installed and the date when it was last calibrated.

☞ Press F5 or ESC to return to the Setup menu.

4.0 Setting the mains voltage and replacing the fuses

Warning

- The fuse box must not be removed from the power control switch until the mains cable has been disconnected.
- The two main fuses must be identical and correspond to the chosen voltage.



① Locate the main fuses in the fuse box in the power control switch and check the voltage of the power control switch (on/off switch (230V/115V)). If the voltage of the power control switch differs from the line voltage, you must adjust the voltage of the power control switch.

② Open the lid of the fuse box using a screwdriver.

③ Remove the fuse box.

④ Remove both fuses and insert two new fuses. These must be identical and should correspond to the line voltage.

- **ATC-125/140/156/157:** 115V, 5AT = 60B315 / 230V, 2.5AT = 123690
- **ATC-250/320/650:** 115V, 10AF = 60B302 / 230V, 5AF = 60B301

If the fuses blow immediately after you have replaced them, the calibrator should be returned to the manufacturer for service.

Slide the fuse box into place with the correct voltage turning upwards.

5.0 After use

5.1 Handling the dry-block calibrator

Warning

NEVER leave hot insertion tubes which have been removed from the calibrator unsupervised – they may constitute a fire hazard.

If you intend to store the calibrator in the optional aluminium carrying case after use, you **must** ensure that the instrument has cooled to a temperature **below 100°C/212°F** before placing it in the carrying case.

Caution…

- The insertion tube must **always** be removed from the calibrator after use.
  The humidity in the air may cause corrosion oxidation to form on the insertion tube inside the instrument. There is a risk that the insertion tube may become stuck if this is allowed to happen.

Caution – Cold surface

- If the calibrator has reached a temperature below 0°C/32°F, ice crystals may form on the insertion tube and on the well. This, in turn, may cause verdigris to form on the material.
  To prevent this from happening, the insertion tube and the well must be dried. This is done by heating up the calibrator to min. 100°C/212°F and any water left will evaporate.
  Remove the insulation plug while heating up.

  It is very important that humidity in the well and insertion tube is removed to prevent corrosion and frost expansion damages.

- Do not touch the well or insertion tube when these are below 0°C/32°F – they can create frost-bites.

The following routine must be observed before the insertion tube is removed and the instrument switched off :

1. If the calibrator has been heated to temperatures greater than 100°C/212°F, you must wait until the instrument reaches a temperature less than 100°C/212°F before you switch it off.
2. If the calibrator has reached a temperature less than 0°C/32°F, it should be heated to a temperature of 100°C/212°F (applies only to the ATC-125/140/156/157 AB models).
   Remove the insulation plug while heating up.
3. Switch off the calibrator using the power control switch (pos. 1 fig. 3).
4. Remove the insertion tube from the calibrator using the tool supplied.
5. **Optional:** Store the calibrator in its protective, aluminium carrying case.

5.2 Handling the liquid-bath calibrator

It is not recommendable to leave the oil in the well for long-term storage.

It is recommended to remove the oil from the well before transportation of the calibrator.

Warning

- **Do not** handle hot oil.
- **Do not** attempt to remove overflow of hot oil with the liquid drainage tube, as it might melt.
- **Do not** leave any oil in the spill tray, as it might leak into the calibrator.

- **Do not** touch the items removed from the well - they may be very hot.
- **NEVER** leave hot items, which have been removed from the well, unsupervised – they may constitute a fire hazard.

The following routines must be observed before emptying the well :

1. Switch off the calibrator using the power control switch (pos. 7 fig. 1b).
2. Before handling the oil, it must be cooled down to a temperature close to ambient.
3. Remove the sensor basket and clean it with disposable paper towels.
4. Remove the stirring magnet using the stirring magnet remover supplied and clean it with disposable paper towels.
5. Empty the well using the liquid drainage tube supplied. Tilting the calibrator is not recommendable, as it increases the risk of splashing oil all over the test area.
6. Any remaining oil in the well is cleaned up using disposable paper towels. It is recommendable to use the optional cleaning oil when cleaning the well.

Warning

- **REMEMBER**, wear goggles when using the cleaning oil.
- **Do not** inhale vapours. Proper ventilation must be used.
- Product information on cleaning oil must be carefully investigated before use.